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immigrant ship, the dead were buried on Staten Island at the quarantine burying-grounds. If we were as ready to profit by past observation as we ought to be, cremation would have been introduced then and there. For in 1866, when some cholera immigrants had been buried on Ward's Island, an epidemic started almost immediately in the part of the city nearest to that burial-ground; there, in 93d Street and 3d Avenue, the first case occurred. This was certainly a fact to be taken into serious consideration. No man interested in the health of his fellows will be content to say that this was only chance. And if it is more than chance, why then has it never been proposed to prevent the propagation of the disease by fire, as other peoples have long been accustomed to do?

There are four rules, by observing which we can absolutely prevent cholera from setting foot on this continent:—

1. Let the drinking-water be perfectly isolated; that is, keep the cholera germs from the drinking-water.
2. Let the fœces and other discharges be disinfected with quick-lime or common white-wash. This is, by the way, what Professor Koch recommended to the Central Sanitary Board of Japan.
3. Let the clothing be disinfected with dry heat, 100° C., and afterwards with steam.
4. Finally, let the cholera corpse be cremated instead of buried.

4 King Street, New York.

ACORN-EATING BIRDS.

BY MORRIS GIBBS, M.D.

IN Michigan there are, to my knowledge, six species of birds which feed on acorns. Of these, the passenger-pigeon and mourning-dove swallow the acorn entire, with its shell intact, only removing the cup or rough outside covering. The white-bellied nut-hatch occasionally hoards the acorns away, and only draws on its store after some months, and when the firm shelly covering readily gives away to its sharp, prying bill. The other three are the well-known blue-jay, common crow-blackbird, and red-headed woodpecker. The methods employed by these birds in opening an acorn are so entirely different, that a description may not be uninteresting to your readers.

Kalamazoo City is nestled in a valley which was once nearly filled with oak trees, and large numbers of the burr-oak, *Quercus macrocarpa*, are still standing. The acorns of these trees, sometimes called over-cup or mossy-cup, are nearly ripe and are now falling, and the birds which feed on them gather to satisfy their love for the nutritious kernels. So far as I am able to learn, the birds, except in rare instances, do not pick the acorns from the tree, but have to content themselves with the fallen fruit. Occasionally one sees a bird attempting to pick an acorn, but it is rarely a success, as the twigs are small and do not accommodate the swaying bird well, and, moreover, at this season of the year, many acorns are still strongly attached.

The red-head, deigning to descend to the ground, seizes an acorn, and flying with it in its bill to a spot where there is a small cavity in the dead portion of a trunk, or to a crevice in the bark, immediately begins to hammer it with its sharp-pointed bill. In a couple of strokes it has removed the outer shell or cup, and at once attacks the still green-colored shell which directly surrounds the meat. The inside, or shell proper, quickly gives way, usually nearly in halves, and the woodpecker enjoys the kernel. The red-head rarely comes into the city, and is never here continuously, but at this season he is quite often seen and heard, and I have thought that the acorns brought him. The woodpeckers are as nearly strict insect-feeders as any birds we have, unless an exception is made of the swifts and swallows, yet here is an instance of a varied diet. However, the red-head is quickly satisfied in the acorn line, and soon begins circling the trunk, or more often limbs, for his legitimate food.

The blackbird confines himself to the ground in his efforts for acorn meats, and I have yet to see him in a tree with one. Walking up sedately to an acorn, and making no effort to seize or confine it, it strikes savagely and almost aimlessly. Its bill frequently glances, and the splintered shell dances about, until at last a huge piece of the kernel is dragged out, after which the bird leaves for other quarters or begins on another acorn.

The jay swoops down with flaunting blue wings, and, seizing the largest acorn on the ground, flies to the nearest convenient limb or onto the decayed ridge-board of an adjacent building. There, firmly pressing the nut between his big, black feet, he hammers away with a vengeance, and quickly tears off nearly half of the shell, after which it proceeds to pick out the meat in small bits. The cup is often left nearly perfect, the jay never making an effort to secure the nut entire, which he could easily do.

Walking under the oaks, one can readily tell whether the woodpeckers, blackbirds, or jays have been at work among the acorns, by the appearance of the mutilated shell-remains lying about.

Kalamazoo, Michigan.

LETTERS TO THE EDITOR.

*** Correspondents are requested to be as brief as possible. The writer's name is in all cases required as proof of good faith.*

On request in advance, one hundred copies of the number containing his communication will be furnished free to any correspondent.

The editor will be glad to publish any queries consonant with the character of the journal.

The Intelligence of a Horse.

CAN a horse reason, or does he act solely from instinct? Many believe that he has reason and intelligence; others attribute all his acts to instinct. As a help to elucidate this question, I wish to present the readers of *Science* the following statement of facts based on long and close observation.

I have a horse, now nineteen years old, that I have owned thirteen years. I have used him all this time almost every day, harnessed to a buggy, in going back and forth to my office. He is very gentle, good-natured, and kind, and has never shown any vices. Soon after I commenced using him, I noticed that on Sundays, whenever I drove him down-town, he strongly insisted, by pulling on the lines, on going to the church where I had been in the habit of attending. I watched this disposition constantly after that, and on every Sunday since, when driven out, he has continued to do the same thing, and, if left to his own will, invariably goes to the church and stops. I thought it possible that he was guided by the ringing of the church bells, and tested him by driving him down-town at all hours of the day, before and after the ringing of the bells; but the result was the same. He invariably insisted on going to church on that day, no matter how often I drove him down-town. My office is one block west and one north of the church, and a half-mile west of my residence. In going to church I usually turn south one block east of the office, but sometimes go around by the office, where I usually drive him every morning and afternoon. In going to my office he never offers to go to the church except on Sunday, but on that day he invariably begins to turn south to the street leading to the church, from fifty to a hundred feet before reaching the crossing, and, if not checked, turns into the street and hurries to the church. He has kept this up for at least twelve years. He never does this on any other day than Sunday. In bad weather or in good weather it is the same, although at the office much of the time he has had stable protection from bad weather. On week-days he often insists on going to the stable in bad weather; but on Sunday, even when I compel him to go by the way of the stable, he pulls over to the opposite side of the street, and hurries on to the church, if permitted, though he may have to stand out in the cold, rain, or snow.

Sometimes, from one cause or another, he has not been taken away from home from one to four weeks, and I supposed that he would lose the run of time, or at least show some hesitation and uncertainty; but not so. On the first Sunday after I drove him out, he insisted, as before, on going to church. He never offers to go

there any other day of the week, though the church bells are rung and numerous services are held nearly every day.

If on Sunday I go to the post-office, which is on the north-west corner of the street-crossing, where we usually turn south to the church, instead of going from there direct to the office as on other days, he turns to the south and goes to the church. He never willingly goes to the post-office on Sunday, but always stops there on week-days of his own accord, if permitted. Many times I have taken other streets on Sunday and approached the church from other directions; but in all cases, when left free, he invariably takes the first street leading to the church. I have experimented with him very largely in this respect, with a view to learning how he keeps the run of time, but am unable to satisfactorily account for it. I have also observed and experimented with him in a great many other ways, and have taught him to know the meaning of many words.

When alarmed at anything, he looks back to me with a frightened look, as much as to say, "Will it harm me?" On my saying to him, "All right, go on," he moves on. If much frightened, he will repeatedly look back for assurance from me.

He knows the meaning of many words, such as office, post-office, school-house, mill, farm, cemetery, church, apple, corn, grass, water, and many others. The fact that he knows the meaning of these words, or at least attaches a meaning to them, I have tested many times in many ways, the relation of which would make this paper too long. When his corn is about used up, if I speak of it to him and say, "Deck, your corn is out; you must go to the mill," even before starting from home, he turns in at the mill as I go by, and goes up to the office door where I have been in the habit of ordering his food. Sometimes I have forgotten it by the time I come opposite the mill, and would have gone by; but he has not forgotten it, and turns in. If I say to him, "Do you want an apple?" of which he is very fond, he puts on the most wistful look and does all in his power to say that he does; and if the apple is not produced at once, he begins to explore my pockets and clothing with his nose in search of an apple suspected to be concealed about my person. If I say to him, "Do you want grass?" he at once shows that he expects to be turned out upon pasture.

He also knows a number of people by name and where they reside; and if told to stop at the residence of one of them, naming him, he will do so, without any guiding.

These are only a few of the many evidences of his intelligence. Hundreds of examples might be given showing his knowledge and intelligence, and that he gives very close attention to and understands what is said to him.

Do not these facts strongly indicate that the horse has more than mere instinct, that he reasons; that out of the store-house of his knowledge and experience he forms conclusions, thoughts, purposes, and plans? He understands certain symbols, such as words; he keeps the run of time and knows uniformly when Sunday comes, for he has not made a mistake in this respect for more than twelve years past; he uses many and diverse means for making his wants known.

Instinct is supposed to imply inherited knowledge of objects and relations in respect to which it is exercised, and will usually, if not always, operate where there is no experience to guide. But this horse's knowledge, in these respects, has not been inherited, but is acquired. He never was at this church till he was six years old. His mother was probably never there. In instinct there is no necessary knowledge of means and ends implied, though such knowledge may be present, but instinct is always manifested in like manner by all individuals of the same species, under like circumstances, which is certainly not true in this case.

Hence I infer that this horse does reason; that he has a high degree of intelligence, even much more than he is able to make us understand and appreciate.

But does the fact of his observing Sunday imply a moral sense? Why does he seek to go to the church on that day? It has been said that animals do reasonable things without having the gift of reason; that they do things involving distant foresight without having any knowledge of the future; that they work for that which is to be without seeing or feeling anything beyond

what is; that they enjoy, but do not understand; that reason works upon and through them, but is not in them. The facts that I have related and observed make me greatly doubt many of these statements. I find it hard to sharply define the limits between instinct and reason. The facts that I have related indicate reason, intelligence, motives, and the formulation of plans, methods, and schemes for carrying out preconceived purposes. Some of the acts, at least, indicate pure reason based upon former and remembered sensations, perceptions, and knowledge, and the purpose to gratify merely mental desires.

What motive does this horse have for going to church every Sunday, even at a sacrifice sometimes? It is not for rest, it is not shelter, it is not feed, it is not company, it is not to gratify any merely physical want, for all these things he has elsewhere every day. Is it not purely an intellectual or moral want that he seeks to gratify? He stands near the church door, hears much of the exercises, especially the singing, and will remain, almost without motion, whether tied or not, till the services are over, and I am ready to go home. But it cannot be for the mere speaking and singing that he hears there, for he often hears speaking, singing, concerts, the Salvation Army, and music of various kinds while he stands tied at the office on the public square; but none of these take the place of his church-going.

These facts I have given as tending to illustrate and explain animal intelligence. I have given only such as I have verified many times.

T. B. REDDING.

Newcastle, Ind., Aug. 22.

The English Sparrow and our Native Birds.

I AM obliged to send a different report regarding the influence of the English sparrow on the presence of native wild birds in a country village.

In 1874-5 there were not more than one or two pairs of these foreigners in the village of Fort Edward. In less than ten years they numbered hundreds, and long since seemed to have reached the limit of the winter-food capacity of the district, being distributed among the farmers' barns as well as in the village.

Before their arrival the chipping sparrow was plentiful; now it is seldom seen. The song-sparrow nested frequently; I have not seen them in the village as residents for several years. Catbirds were not infrequent; now they come in the early spring for a few days, then disappear, though thickets on the river-bank near the town are especially favorable. Summer yellow-birds built often in the low trees; I have not seen a single resident this summer. Wilson's thrush also was an occasional resident; none have been here for four or five years. The vireo used to build and sing in the elms and apple-trees; they are very rare indeed now. The wood-phoebe, though their early morning song is still heard, are few in number where they were once abundant. The robin is almost the sole bird, in so far as I have observed, that holds his own regardless. I will except also the black martin, or house martin, who manages to turn out about four-fifths of the sparrows. The other fifth so blockade the entrance to the holes with their nests that the martin is effectually shut out. Bluebirds too have left us, they are too weak, and too refined in their tastes to long live neighbors to such low-lived little beasts as the filth-loving, quarrelsome, meddlesome sparrows.

I have a box in my garden which the sparrows do not dare to occupy, for they know me. But the bluebirds, who formerly nested there, come occasionally in the spring, have a tilt or two in the trees with the sparrows, then leave in disgust. Probably no native wild bird begins to have the mental development and quick wit possessed by the English sparrow. But all his wit runs to saving his precious self from danger and from exertion; hence he will, without doubt, persist. See, for example, how little strength he uses in avoiding danger. He just gets beyond range of whip or stone, and sits and calmly looks you over. He avoids poison with as much foresight as you could, and will starve rather than eat suspected food. He rolls in mud and dirt, oblivious of all else, just for the fun of having a lively squabble with some fellow, and when it is over is pecking about in the next ten seconds as if nothing had happened.